

REMARKS

Reconsideration and allowance of the present patent application based on the following remarks are respectfully requested. Claim 1 has been amended merely to correct a typographical error without the intention of narrowing the scope of any of the claims. Claims 1-6, 8-25, 27-44, and 46-62 are pending.

Entry of the Amendment is proper under 37 C.F.R. §1.116 as the amendments: (a) place the application in condition for allowance for the reasons discussed herein; (b) do not present any new issues that would require further consideration and/or search as the amendments merely amplify issues discussed throughout the prosecution; (c) do not present any additional claims without canceling a corresponding number of claims; (d) place the application in better form for appeal, should an appeal be necessary; and (e) were not made earlier because they are made in response to the points first presented in the final Office Action. Entry of the Amendment is thus respectfully requested along with withdrawal of the final Office Action.

Examiner's Response to Applicant's Arguments of February 24, 2006

In response to Applicant's arguments, the Examiner states that "Dierichs and Takahashi are not depended upon to disclose the formation of a protective top coating on the absorber layer. Yan is depended upon to disclose the formation of a top layer (protective layer) on the absorber layer. Yan teaches forming a top layer of may be about 20 nm (about 20 nm includes about 5 nm)."

While Applicant agrees that Dierichs et al. and Takahashi et al. do not disclose, teach or suggest a protective top coating on an aluminium absorber or coating as claimed, Applicant disagrees that Yan et al. disclose, teach or suggest a protective top coating having a thickness of about 0.1 to about 5 nm as recited in independent claims 1, 20, 39 and 55. Simply put, Applicant submits that a person skilled in the art in view of the nature of this art, the overall disclosure of Yan et al., and the difference in purpose of the claimed protective top coating from the top layer in Yan et al. would not view the disclosure in Yan et al. of a top layer of "about 20 nm" as including a protective top coating having a thickness of about 0.1 to about 5 nm.

First, 5 nm is one-quarter or 25% of the value of 20 nm. Stated differently, 20 nm is four times or 400% of the value of 5 nm. In view of such a large difference in value, Applicant submits that a person skilled in the art would not consider “about 20 nm” as including “about 5 nm” in the same manner that someone would not understand that a store is about a 5 minute walk away would mean or encompass about a 20 minute walk. The values are simply different in scale. So, while the word “about” allows for some deviation from the specified value, Applicant submits that a deviation of, for example, 400% is unreasonable in view of the disclosure of Yan et al. and the nature of patterning structure (e.g., mask) technology, a technology which necessarily involves small and precise dimensions in order to image typically even smaller and precise dimensions on a substrate.

The difference between “about 20 nm” and “about 5 nm” is also evident from the usage of other values of thickness in other parts of Yan et al. For example, Yan et al. refers to the thickness of the absorber layer 1400 as being from “about 45-215 nm.” Using Examiner’s logic, that range should be covered simply by the statement of “about 130 nm” since, by extension of the Examiner’s argument, that statement should cover 33 nm to 520 nm. Clearly, such a result wouldn’t make sense and hence “about 20 nm” cannot encompass “about 5 nm.”

Applicant submits that Examiner’s argument further fails in light of the practical differences between the protective top coating as claimed and the top layer as disclosed in Yan et al. A significant problem is design of a EUV lithographic process with little or no phase induced aberrations. For example, a problem with prior art EUV masks is that the top coating is of a material with a refractive index not close to an ideal refractive index and having a large thickness that magnifies the deviation from an ideal refractive index. See, e.g., paragraph 10 of Applicant’s specification. Accordingly, Applicant’s claimed invention recites a patterning structure suited for, e.g., EUV lithography, that comprises an aluminium coating or absorber having a protective top coating having a thickness of about 0.1 to about 5 nm. The aluminium coating or absorber is close to an ideal refractive index and is effective to eliminate or at least minimize the formation of aberration in the patterned beam. The protective top coating is sized to at least avoid impact on the effectiveness of the aluminium coating or absorber. For example, in EUV lithography, the protective top coating would be thinner than the typical EUV wavelength used, i.e., about 13.5 nm, and accordingly will have little or no effect on EUV radiation.

The foregoing highlights a fundamental difference between the protective top coating as claimed and the top layer of Yan et al. The protective top coating as claimed is provided to protect the aluminium coating or absorber of the patterning structure, wherein the patterning

structure improves imaging, due in large part, if not completely, by the aluminium coating or absorber, by eliminating or at least minimizing the formation of aberrations in the patterned beam. In contrast, the top layer of Yan et al. is provided merely to improve contrast at UV/DUV wavelengths without consideration of aberrations. The top layer of Yan et al. is designed to have a higher absorbance and/or lower reflectivity than the absorber layer. See, Yan et al., col. 3, lines 27-32. The effect of this is to improve contrast of the mask at UV/DUV wavelengths. See, Yan et al., col. 5, lines 33-36. An extremely thin top layer in Yan et al. likely would not have the desired effect in Yan et al. as it would fail to properly absorb more radiation or reflect less radiation than the absorber layer below it in order to improve contrast. Hence, Yan et al. discloses a top layer of significant thickness of about 20 nm. In contrast, the claimed protective top coating is comparatively thin to protect the desired aluminium absorber or coating without introducing significant, if any, optical effects.

Therefore, for at least the above and following reasons, the cited portions of Yan et al. fail to disclose, teach or suggest all the features recited by independent claims 1, 20, 39 and 55.

**Rejections of Claims 39-44, 46-51 and 53-57 under 35 U.S.C §102(e) and
Claims 1-6, 8-25, 27-38, 52 and 58-62 under 35 U.S.C. §103(a)**

Claims 39-44, 46-51 and 53-57 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. patent no. 6,583,068 to Yan et al. ("Yan et al."). Applicant respectfully traverses the rejection, without prejudice.

Applicant respectfully submits that the cited portions of Yan et al. fail to disclose, teach or suggest a patterning structure comprising, *inter alia*, an aluminium coating with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in independent claim 39. Further, Applicant respectfully submits that the cited portions of Yan et al. fail to disclose, teach or suggest a method of forming a patterning structure for use in a lithographic apparatus, the method comprising, *inter alia*, forming a protective coating having a thickness of about 0.1 to about 5 nm on top of the aluminium absorber as recited in independent claim 55.

Yan et al. merely disclose a top coating having a thickness of about 20 nm thick. Yan et al., col. 3, lines 26-26 and Yan et al, col. 6, lines 34-35. As discussed in Applicant's specification, a significant problem is design of a EUV lithographic process with little or no phase induced aberrations. For example, a problem with prior art EUV masks is that the top

coating is of a material with a refractive index not close to an ideal refractive index and having a large thickness that magnifies the deviation from an ideal refractive index. See, e.g., paragraph 10 of Applicant's specification. Accordingly, Applicant's claimed invention recites an aluminium coating or absorber having a protective top coating having a thickness of about 0.1 to about 5 nm, wherein the protective top coating is primarily designed to protect the aluminium absorber or coating without introducing significant, if any, optical effects. In contrast, Yan et al. merely focuses on obtaining a high contrast EUV mask suitable for UV/DUV inspection. Yan et al., col. 1, lines 39-52. The top layer of Yan et al. is designed to have an effect on the contrast of the mask and accordingly, it is a top layer of significant thickness to provide the high absorption and/or low reflection needed to improve contrast at UV/DUV wavelengths. Thus, Applicant submits that the cited portions of Yan et al. at least fail to disclose, teach or suggest the claimed protective top coating having a thickness of about 0.1 to about 5 nm.

Therefore, for at least the above reasons, the cited portions of Yan et al. fail to disclose, teach or suggest all the features recited by independent claims 39 and 55. Claims 40-44, 46-51 and 53-54 depend from claim 39 and claims 56-57 depend from independent claim 55 and are, therefore, patentable for at least the same reasons provided above related to respectively claims 39 and 55, and for the additional features recited therein. As a result, Applicant respectfully submits that the rejection under 35 U.S.C. §102(e) of claims 39-44, 46-51 and 53-57 in view of Yan et al. should be withdrawn and the claims allowed.

Claims 1-6, 8-13, 15-25, 27-32, 34-38 and 58-62 stand rejected under 35 U.S.C. §103(a) as being obvious in view of Yan et al. further in view of U.S. patent application publication no. 2005/0136334 to Dierichs et al. ("Dierichs et al."). Applicant respectfully traverses the rejection, without prejudice.

Applicant respectfully submits that the comments above regarding Yan et al. with respect to independent claims 39 and 55 applies analogously to independent claims 1 and 20. In particular, the cited portions of Yan et al. fail to disclose, teach or suggest a lithographic apparatus comprising, *inter alia*, an aluminium absorber layer with a protective top coating as recited in claim 1. Similarly, the cited portions of Yan et al. fail to disclose, teach or suggest a device manufacturing method comprising, *inter alia*, minimizing formation of aberrations in the patterned beam by using a patterning structure having an aluminium absorber layer with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in claim 20. As discussed above with respect to independent claims 39 and 55, the cited portions of Yan et al.

fail to disclose, teach or suggest the claimed thickness of the protective top coating on the aluminium absorber layer.

Furthermore, the cited portions of Dierichs et al. fail to overcome any of the deficiencies of Yan et al. In particular, the cited portions of Dierichs et al., as admitted by the Office Action, fail to disclose, teach or suggest a lithographic apparatus comprising, *inter alia*, an aluminium absorber layer with a protective top coating as recited in claim 1. Further, the cited portions of Dierichs et al., as admitted by the Office Action, fail to disclose, teach or suggest a device manufacturing method comprising, *inter alia*, minimizing formation of aberrations in the patterned beam by using a patterning structure having an aluminium absorber layer with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in claim 20.

Claims 2-6, 8-13, 15-19 and 58-62 depend from claim 1 and claims 21-25, 27-32 and 34-38 depend from independent claim 20 and are, therefore, patentable for at least the same reasons provided above related to respectively claims 1 and 20, and for the additional features recited therein.

Because the cited portions of Yan et al. and Dierichs et al. taken singly or in any proper combination, fail to disclose, teach or suggest the claimed subject matter of claims 1-6, 8-13, 15-25, 27-32, 34-38 and 58-62, Applicant respectfully requests that the rejection under 35 U.S.C. §103(a) of claims 1-6, 8-13, 15-25, 27-32, 34-38 and 58-62 based on Yan et al. in view of Dierichs et al. be withdrawn and the claims allowed.

Claims 14 and 33 stand rejected under 35 U.S.C. §103(a) as being obvious in view of Yan et al. and Dierichs et al. and further in view of U.S. patent application publication no. 2005/0040413 to Takahashi et al. ("Takahashi et al."). Applicant respectfully traverses the rejection, without prejudice.

Applicant respectfully submits that the comments above regarding Yan et al. with respect to independent claims 39 and 55 applies analogously to independent claims 1 and 20. In particular, the cited portions of Yan et al. fail to disclose, teach or suggest a lithographic apparatus comprising, *inter alia*, an aluminium absorber layer with a protective top coating as recited in claim 1. Similarly, the cited portions of Yan et al. fail to disclose, teach or suggest a device manufacturing method comprising, *inter alia*, minimizing formation of aberrations in the patterned beam by using a patterning structure having an aluminium absorber layer with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in claim 20. As discussed above with respect to independent claims 39 and 55, the cited portions of Yan et al.

fail to disclose, teach or suggest, for example, the claimed thickness of the protective top coating on the aluminium absorber layer.

Furthermore, the cited portions of Dierichs et al. and/or of Takahashi et al. fail to overcome any of the deficiencies of Yan et al. In particular, the cited portions of Dierichs et al. and/or of Takahashi et al., as admitted by the Office Action, fail to disclose, teach or suggest a lithographic apparatus comprising, *inter alia*, an aluminium absorber layer with a protective top coating as recited in claim 1. Further, the cited portions of Dierichs et al. and/or of Takahashi et al., as admitted by the Office Action, fail to disclose, teach or suggest a device manufacturing method comprising, *inter alia*, minimizing formation of aberrations in the patterned beam by using a patterning structure having an aluminium absorber layer with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in claim 20.

Claim 14 depends from claim 1 and claim 33 depends from independent claim 20 and are, therefore, patentable for at least the same reasons provided above related to respectively claims 1 and 20, and for the additional features recited therein.

Because the cited portions of Yan et al., Dierichs et al. and Takahashi et al. taken singly or in any proper combination, fail to disclose, teach or suggest the claimed subject matter of claims 14 and 33, Applicant respectfully requests that the rejection under 35 U.S.C. §103(a) of claims 14 and 33 based on Yan et al. in view of Dierichs et al. further in view of Takahashi et al. be withdrawn and the claims allowed.

Claim 52 stands rejected under 35 U.S.C. §103(a) as being obvious in view of Yan et al. and further in view of Takahashi et al. Applicant respectfully traverses the rejection, without prejudice.

As discussed above, Applicant respectfully submits that the cited portions of Yan et al. fail to disclose, teach or suggest a patterning structure comprising, *inter alia*, an aluminium coating with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in independent claim 39.

Furthermore, the cited portions of Takahashi et al. fail to overcome any of the deficiencies of Yan et al. In particular, the cited portions of Takahashi et al., as admitted by the Office Action, fail to disclose, teach or suggest a patterning structure comprising, *inter alia*, an aluminium coating with a protective top coating having a thickness of about 0.1 to about 5 nm as recited in independent claim 39.

Claim 52 depends from independent claim 39 and is, therefore, patentable for at least the same reasons provided above related to claim 39, and for the additional features recited therein.

Because the cited portions of Yan et al. and/or Takahashi et al. taken singly or in any proper combination, fail to disclose, teach or suggest the claimed subject matter of claim 52, Applicant respectfully requests that the rejection under 35 U.S.C. §103(a) of claims 52 based on Yan et al. in view of Takahashi et al. be withdrawn and the claims allowed.

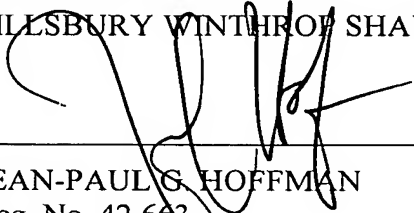
In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975 under our order no. 081468/0309086. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

PILLSBURY WINTHROP SHAW PITTMAN LLP



JEAN-PAUL G. HOFFMAN
Reg. No. 42,663
Tel. No. 703-770-7794
Fax No. 703-770-7901

JGH
P. O. Box 10500
McLean, VA 22102
(703) 770-7900